

## Description of the final stadium larva of *Periaeschna zhangzhouensis* Xu, with discussion of taxonomic characters of the larvae of the genus *Periaeschna* Martin (Odonata: Aeshnidae)

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The final stadium larva of *Periaeschna zhangzhouensis* Xu is described and illustrated for the first time. The taxonomic characters of the larvae of the genus *Periaeschna* Martin are discussed and summarized.

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### Introduction

The genus *Periaeschna* Martin presently includes 11 known species (Schorr & Paulson, 2013; Xu, 2012), occurring in Indo-China and South-East Asia. Among them, *P. zhangzhouensis* Xu (2007) is endemic to southern China. To date, only the larvae of *P. flinti* Asahina, 1978, *P. magdalena* Martin, 1909, *P. laidlawi* (Förster, 1908), and *P. yazhenae* Xu, 2012 have been described (Chan, 2009; Kawashima & Sasamoto, 2006; Matsuki & Lien, 1984; Xu, 2012; Zhang & Tong, 2011). In the present paper, the final stadium larva of *P. zhangzhouensis* is described and illustrated for the first time, and, after analysis of the descriptions of the morphological characters of five known *Periaeschna* larvae, the taxonomic characters of the larvae of the genus *Periaeschna* Martin are summarized.

### Description of the final stadium larva of *Periaeschna zhangzhouensis* Xu, 2007

#### *Specimens studied*

Nine final stadium larvae: 7♂, 2♀, Fujian Province, Nanjing County (24°38' N, 117°11' E), 4 May 2013, leg. XU Q.-h.; 1♂ and its exuvia, same data, emerged in laboratory on 14 May 2013; all

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specimens are deposited in Department of Garden and Horticulture, Zhangzhou City University, Fujian, China.

*Description of the final stadium larva (Figures 1, 2a–c)*

Medium-sized aeshnid larva with broad head and elongate abdomen, ground colour brownish yellow, brown or brownish green, marked with distinct dorsal and lateral spots as shown in Figure 2a–c.

**Head.** Large and pentagonal, flat dorsally. Compound eyes large, protruding anterolaterally. Postocular lobe (Figure 1a) rounded, with 4 or 5 tubercle-shaped swellings on posterolateral angle. Antenna (Figure 1b) 7-segmented, filiform, as long as the distance between the two antennae; segments 1–2 (scape and pedicel) thickened, segments 3–7 slender, elongate and tapering. Prementum (Figure 1c, d) large, longer than wide, in a ratio of 2:1, extending posteriorly to the level of mesocoxae; median lobe prominent, with a shallow medial cleft margined by apical projection on each side armed with a black spine; anterior margin of median lobe covered with dense pale brown hairs; lateral lobe short and robust, narrower at base than median lobe in width; internal lobe broad, furnished with numerous small irregular serrations on its inner side; end hook short and triangular, sharp inward apically; movable hook long and acuminate, about twice length of internal lobe.

**Thorax.** Markedly narrower than head. Pronotum trapezoidal, its base broader and arched downward. Two processes present on prothoracic pleura (Figure 1e), anterior one roughly finger-shaped, with a rounded apex; posterior one triangular dorsally with a moderately pointed apex, almost the same length as anterior one; wing sheaths parallel, hind wing sheaths reaching the middle of abdominal S3 or beyond base of abdominal S4. Legs slender and long; tarsal formula 3-3-3; claws small and simple.

**Abdomen.** Roughly spindle-shaped; ventral surface flat, dorsal surface convex; greatest width across distal border of S7. Posteriorly directed lateral spines (Figure 1f) present on S5–9, the 5th one very small. Dorsal hooks absent. Male anal pyramid (Figure 1g, h) a little longer than the length of S9 + 10; cercus acuminate, a little shorter than half the length of epiproct; epiproct narrowly triangular, pointed at apex, with a stout projection at near basal 1/2 length, and furnished with a row of acute spines on mid-dorsal ridge; paraprocts nearly equal to epiproct, acuminate apically, carinate along middle longitudinal axis and armed with a row of acute spines. Female anal pyramid (Figure 1i) resembles the male one, differing chiefly in two respects as follows: cerci very short, only 1/4 length of epiproct; epiproct without a stout projection at dorsal base. Ovipositor valvulae (Figure 1j) very long, primary lateral valvulae reaching beyond distal border of abdominal S10, and primary ventral valvulae reaching to 1/4 of the length of paraprocts.

**Coloration.** Among the 9 collected larval specimens, 5 with ground colour brownish yellow, 3 brown, and 1 brownish green. All with a longitudinal pale stripe on mid-dorsum from abdominal S2 to S10, and the stripes on S8–9 expanded, spindle-shaped; with 1 oval pale spot on each side of abdominal S2 to S4, and 2 oval and circular pale spots on each side of abdominal S5 to S9. Femora and tibiae marked with three brown ring-like markings respectively. Ventral surface of body more or less paler than dorsal side.

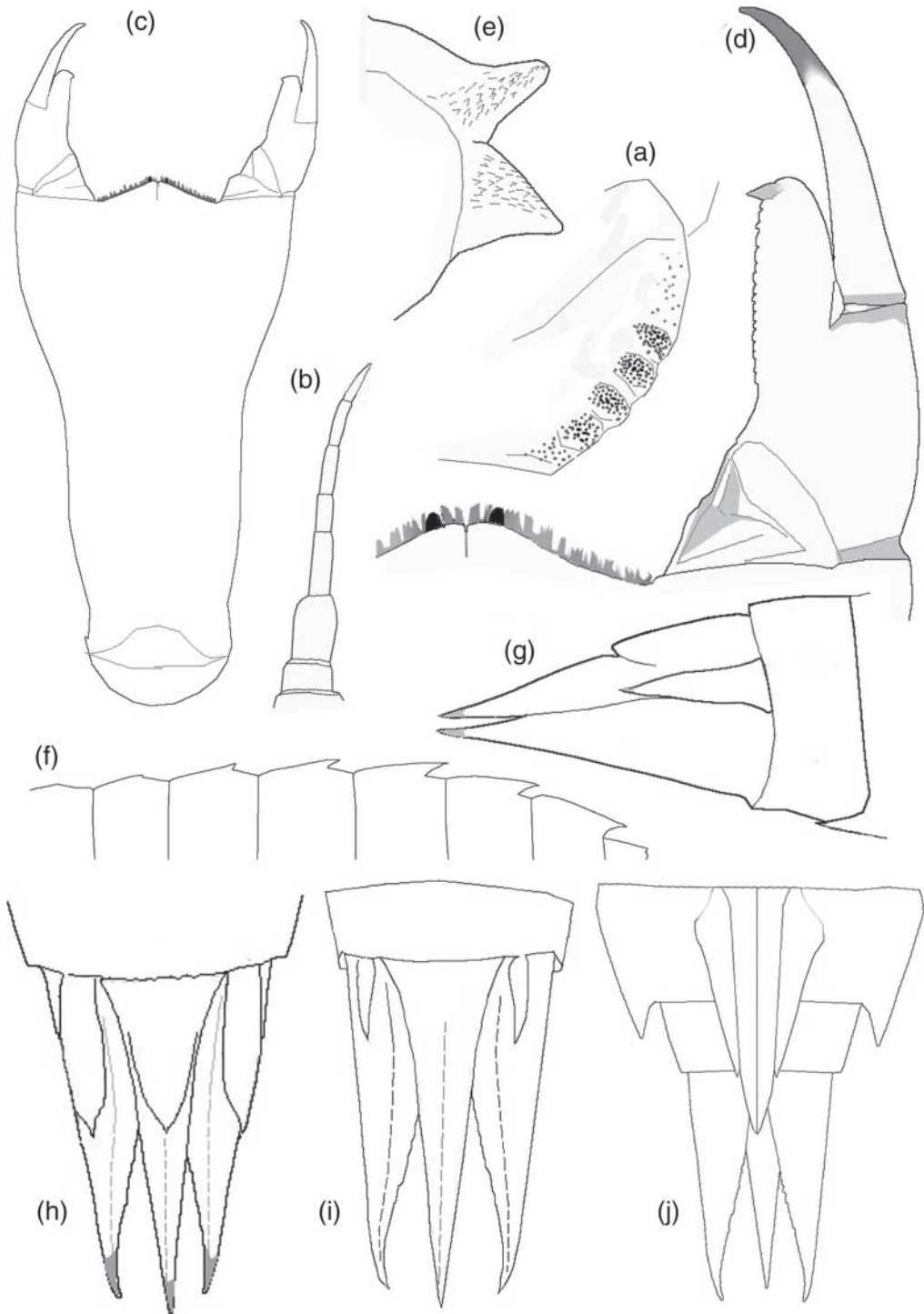


Figure 1. The final stadium larva of *Periaeschna zhangzhouensis*: (a) postocular lobe, dorsal view; (b) antenna, dorsal view; (c) prementum, ventral view; (d) lateral lobe and anterior border of prementum, ventral view; (e) processes of prothoracic pleura, right side, dorsal view; (f) lateral abdominal spines, dorsal view; (g) male, anal pyramid, lateral view; (h) male, anal pyramid, dorsal view; (i) female, anal pyramid, dorsal view; (j) female, distal abdominal segments and anal pyramid, ventral view.



Figure 2. Larva and adult of *Periaeschna zhangzhouensis*: (a–c) final stadium larva (colour variations); (d) male adult, dorsal view; (e) male adult, lateral view; (f) female adult, dorsal view; (g) female adult, lateral view.

*Measurements [mm].* Total length 33.0–36.8, greatest width of head 6.2–6.9, length of antenna 1.2–1.4, length of metafemur 5.1–5.5, length of hind wing sheath 7.6–8.5, length of abdomen 22.1–25.5, greatest width of abdomen 5.8–6.4;  $n = 9$ .

### Differential diagnosis

Of the five known *Periaeschna* larvae, that of *P. zhangzhouensis* appears to have closer similarity with that of *P. magdalena*. The larvae of both species share several morphological characters, e.g. prementum longer than that of other three larvae; abdomen with a longitudinal pale stripe on mid-dorsum; and ovipositor valvulae longer, reaching to 1/4 of the length of paraprocts.

The larva of *P. zhangzhouensis* can be easily separated from those of *P. magdalena* and *P. yazhenae* by its 7-segmented antenna (the latter two with 6-segmented antenna); from that of *P. flinti* and *P. laidlawi* by its ovipositor valvulae reaching to 1/4 of the length of paraprocts (the latter two with ovipositor valvulae barely reaching distal margin of 10th sternite or reaching to 1/2 of the length of paraprocts); from all known larvae by its larger habitus, longer prementum and larger number of serrations on inner side of internal lobe of prementum; and finally, from all known larvae by its distinct abdominal colour pattern mentioned above.

### Biological notes

All larvae of *Periaeschna zhangzhouensis* were found clinging to aquatic weeds in a mountain stream within shady canopies of riparian vegetation. In Fujian adults (Figure 2d, e, f, g) first appear in June and the flying season ends in August. Flying season in Guangdong is similar to Fujian and in Central Guizhou they emerge in July and fly until the end of September. The species was first described in Fujian, then recorded in Guangdong (Wilson and Xu, 2008), and recently found in south-western China, including Sichuan (2♂, 1♀, Mt. Emeishan, 15 August 2010, leg. Haomiao Zhang) and Guizhou (5♂, 1♀, Xiangzhigou, Guiyang City, 25–30 August 2012, leg. Haomiao Zhang).

### Distribution

China (Fujian, Guangdong, Guizhou and Sichuan).

## Discussion of the taxonomic characters of the larvae of the genus *Periaeschna* Martin

Kawashima & Sasamoto (2006) summarized the main common characters of the larvae of both *Periaeschna laidlawi* and *P. magdalena* as follows: (1) the median cleft of prementum deep, opened in a V-shape at the entrance part; (2) the lateral spines present on sixth to seventh abdominal segments in female; (3) paraproct slender and rather long, the apex of epiproct not bifurcate, and sharply pointed. Apparently, this summary does not cover well the common characters of the five known *Periaeschna* larvae.

After analysis of the descriptions of the morphological characters of five known *Periaeschna* larvae, the major taxonomic characters of the larvae of the genus *Periaeschna* can be tentatively summarized as follows: (1) large head and elongate abdomen, legs rather slender and relatively long; (2) antenna very short and simply filiform, six or seven-segmented; (3) prementum large, longer than wide, in a ratio of 1.5–2:1; median lobe prominent, with a medial cleft margined by apical projections on each side armed with a small spine; lateral lobe short and robust, its inner side with a row of small irregular serrations; (4) lateral spines present on S5 (or S6) to S9, dorsal hooks absent; (5) cerci moderately long in male, about half length of epiproct, very short in female; epiproct with a stout projection at near half length in male, while absent in female; (6) the length of ovipositor valvulae varying, from barely reaching distal margin of 10th sternite to reaching 1/2 of the length of paraprocts.

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## References

- Chan, T. (2009). *Taxonomic studies of the larval stage of Aeshnidae (Odonata) in Taiwan* (Master thesis). Graduate Institute of Biological Resources and Technology, National Dong Hwa University, Taiwan.
- Kawashima, I., & Sasamoto, A. (2006). Description of the last instar larva of *Periaeschna laidlawi* (Förster) (Anisoptera, Aeshnidae) from Malaysia, southwestern Asia. *Tombo*, 48, 12–17. Retrieved from <http://ci.nii.ac.jp/naid/10026159398>
- Matsuki, K., & Lien, J. C. (1984). Description of the larva of *Periaeschna magdalena* Martin from Taiwan (Anisoptera: Aeshnidae). *Odonatologica*, 13, 245–248.
- Schorr, M., & Paulson, D. (2013). World Odonata list [Dataset updated June 14, 2013]. Retrieved from <http://www.pugetsound.edu/academics/academic-resources/slater-museum/biodiversity-resources/dragonflies/world-odonata-list>
- Wilson, K. D. P., & Xu, Z. (2008). Aeshnidae of Guangdong and Hong Kong (China), with the descriptions of three new *Planaeschna* species (Anisoptera). *Odonatologica*, 37, 329–360.
- Xu, Q.-H. (2007). *Periaeschna zhangzhouensis* spec. nov. from Fujian, China (Anisoptera: Aeshnidae). *Odonatologica*, 36, 315–318.
- Xu, Q.-H. (2012). *Periaeschna yazhenae* sp. nov. from Fujian, China (Odonata: Anisoptera: Aeshnidae). *Zootaxa*, 3526, 72–78. Retrieved from <http://www.mapress.com/zootaxa/2012/f/z03526p078f.pdf>
- Zhang, H.-M., & Tong, X.-L. (2011). Descriptions of *Boyeria karubei* Yokoi and *Periaeschna f. flinti* Asahina larvae from China (Anisoptera: Aeshnidae). *Odonatologica*, 40, 57–65. Retrieved from <http://odonatologica.com/Web/abstracts/pdf/40-1.pdf>